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LIU & LIU

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EXAMINER

RAINEY, ROBERT R

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/535,369	Applicant(s) LOUWSMA ET AL.	
	Examiner ROBERT R. RAINEY	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4APR08, 2APR08, 18MAY05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 1 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed device has “switching means for connecting the picture electrodes to the selection electrodes and data electrodes” but the selection and data electrodes are on “a first substrate provided with selection electrodes and data electrodes” whereas the picture electrodes are on “a second substrate in which picture electrodes at picture elements are present” with the two substrates separated by a liquid crystal. Applicant has provided no disclosure as to how this connection is to be made.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1,2,4 12 and 13** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. The recitation of claim 1 "the drive means" in the line fourth from the bottom of the claim has two possible antecedents "drive means for driving the picture elements" in the fifth line of the claim or "drive means for driving the selection electrodes" in the sixth line of the claim. Since it is unclear which drive means is referred to the claim is indefinite.

6. The phrase of claim 1 "drive means for driving the selection electrodes which, in the operation condition, within a sequence of m ($m > 1$) time periods, during each time period sequentially selection electrodes during a selection time with selection signals for driving picture elements," does not create an understandable whole. For example, if one removes the modifying prepositional phrases, the phrase reads, "drive means for driving the selection electrodes which ... sequentially selection electrodes", which makes no sense.

7. The recitation of claim 2 "the drive means" in the line fourth from the bottom of the claim has two possible antecedents "drive means for driving the column electrodes" in the fourth and fifth line of the claim or "drive means for driving the row electrodes" in the sixth line of the claim. Since it is unclear which drive means is referred to the claim is indefinite.

8. The recitation of claim 2, "... drive means ... supply groups of p ($p \geq 1$) row electrodes ... with mutually orthogonal selection signals ..." is indefinite. It is not clear how a signal supplied to a single row, i.e. $p=1$, can be mutually orthogonal with itself.

9. The recitation of claim 4, the last two lines "said sequences being allotted to non-sequential selections of time periods within a sequence of time periods" is indefinite.

What does a sequence being allotted to a non-sequential selection of time periods mean? How does a sequence have a non-sequence time period?

10. The recitation of claims 12 and 13, the letter "p". There is insufficient antecedent basis for this limitation in the claim.

Drawings

11. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **"display device comprising a liquid crystal between a first substrate provided with selection electrodes and data electrodes and a second substrate in which picture electrodes at picture elements are present and switching means for connecting the picture electrodes to the selection electrodes and data electrodes and drive means for driving the picture elements in conformity with an image to be displayed, and drive means for driving the selection electrodes"** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

12. The drawings are objected to because the unlabeled rectangular boxes shown in the drawings should be provided with descriptive text labels.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

13. Claim 1 objected to because of the following informalities: the word "conformity" is misspelled as "confirmity". Appropriate correction is required.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. **Claim 2** is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*").

As to **claim 2**, *Ishii* discloses a flat panel display controller and in particular: a display device comprising a liquid crystal between a first substrate provided with row or selection electrodes and a second substrate provided with column or data electrodes, in which overlapping parts of row and column electrodes define picture elements (the construction of passive matrix displays, mentioned at for example column 1 lines 25-28, as claimed was well known to those skilled in the art at the time of the invention and the existence of row and column electrodes is further implied at column 7 lines 1-4 especially "column and row counters"), drive means for driving the column electrodes in conformity with an image to be displayed (see for example column 1 lines 27-32, *Ishii* does not explicitly mention separate column drivers but this would have been fairly suggested to one of ordinary skill in the art at the time of the invention), and drive means for driving the row electrodes (see for example column 1 lines 27-32, *Ishii* does not explicitly mention separate row drivers but this would have been fairly suggested to one of ordinary skill in the art at the time of the invention) which, in the operating condition, within a sequence of m ($m > 1$) time periods (see for example column 1 line 39, which describes the use of "Frame Rate Control", which is well known in the art, as evidenced by the instant application publication [0004] - [0006], to include consecutive frame periods or super-frames, i.e. "a sequence of m ($m > 1$) time periods" made up of a certain number of consecutive, i.e. " m ($m > 1$)", frame periods, i.e. "time periods"), during each time period

sequentially supply groups of p ($p \geq 1$) row electrodes during a selection time with mutually orthogonal selection signals for driving picture elements (this is inherent since, according to traditional structure, each row electrode is not electrically connected to any other row electrode, the signals introduced to each row electrode do not interfere with each other and are in this sense orthogonal -- see reference and additional discussion below), the drive means comprising means for driving a group of picture elements during time periods within a sequence of time periods, the driving of different picture elements within a sequence of time periods being phase-shifted with respect to each other (see for example column 1 lines 39-42, "Frame Rate Control (FRC), which involves introduction of a phase shift for excitation of adjacent pixels ...").

A relevant definition of "orthogonal" is:

3. A generalization of the mathematical meaning, describing sets of primitives or capabilities that span the entire "capability space" of the system and are in some sense nonoverlapping or mutually independent.

"orthogonal." Hargrave's Communications Dictionary, Wiley. 2001.

CredoReference. 22 April 2008

<<http://www.credoreference.com/entry/2723245>>

One sense in which the signals applied to the rows are nonoverlapping or mutually independent is that described above: they are not electrically connected to each other. Another sense in which they are mutually orthogonal is that if we assume $p=2$ and apply a select voltage to row n and a non-select voltage to row

n+1, the result is a selection of the desired pixels of row n without interference, i.e. inappropriate selection of the pixels of row n+1.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*") in view of applicants admitted prior art.

In order to advance prosecution, Examiner offers this second rejection of claim 2 based more closely on the disclosed invention rather than merely on the claimed invention.

As to **claim 2**, *Ishii* discloses a flat panel display controller and in particular: a display device comprising a liquid crystal between a first substrate provided with row or selection electrodes and a second substrate provided with column or data electrodes, in which overlapping parts of row and column electrodes define picture elements (the construction of passive matrix displays, mentioned at for example column 1 lines 25-28, as claimed was well known to those skilled in the art at the time of the invention and the existence of row and column electrodes is further implied at column 7 lines 1-4 especially "column and

row counters”), drive means for driving the column electrodes in conformity with an image to be displayed (see for example column 1 lines 27-32, *Ishii* does not explicitly mention separate column drivers but this would have been fairly suggested to one of ordinary skill in the art at the time of the invention), and drive means for driving the row electrodes (see for example column 1 lines 27-32, *Ishii* does not explicitly mention separate row drivers but this would have been fairly suggested to one of ordinary skill in the art at the time of the invention) which, in the operating condition, within a sequence of m ($m > 1$) time periods (see for example column 1 line 39, which describes the use of “Frame Rate Control”, which is well known in the art, as evidenced by the instant application publication [0004] - [0006], to include consecutive frame periods or super-frames, i.e. “a sequence of m ($m > 1$) time periods” made up of a certain number of consecutive, i.e. “ m ($m > 1$)”, frame periods, i.e. “time periods”), the drive means comprising means for driving a group of picture elements during time periods within a sequence of time periods, the driving of different picture elements within a sequence of time periods being phase-shifted with respect to each other (see for example column 1 lines 39-42, “Frame Rate Control (FRC), which involves introduction of a phase shift for excitation of adjacent pixels ...”).

Ishii does not expressly disclose during each time period sequentially supply groups of p ($p \geq 1$) row electrodes during a selection time with mutually orthogonal selection signals for driving picture elements.

Applicant's admitted prior art discloses during each time period sequentially supply groups of p ($p \geq 1$) row electrodes during a selection time with mutually orthogonal selection signals for driving picture elements (see for example [0003] of the publication of the instant application).

Ishii and Applicant's admitted prior art are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to modify the device of *Ishii* to include the multi-row orthogonal vector drive scheme as disclosed by Applicant's admitted prior art. The suggestion/motivation would have been to provide advantages such as to avoid the phenomenon of frame response or to realize a high number of lines (see for example [0003] of the publication of the instant application).

18. **Claims 1 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,873,312 to *Matsueda* ("*Matsueda*") in view of U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*").

As to **claim 1**, *Matsueda* discloses a display device (as best understood by the Examiner, Applicant is attempting to claim an active-matrix type LCD, the separation of the selection and data electrodes from the pixel electrode by the liquid crystal will be ignored for this rejection) comprising a liquid crystal between a first substrate provided with selection electrodes (see for example Fig. 1 item 5

"SCANNING LINE") and data electrodes (see for example Fig. 1 item 4 "SIGNAL LINE") and a second substrate in which picture electrodes (see for example Fig. 1 the upper electrode of item 8 "LIQUID CRYSTAL CAPACITOR") at picture elements are present and switching means (see for example Fig. 1 item 6 "PIXEL TFT") for connecting the picture electrodes to the selection electrodes and data electrodes and drive means (see for example Fig. 1 item 2 "DATA DRIVER SECTION") for driving the picture elements in conformity (examiner assumes "conformity" is meant) with an image to be displayed, and drive means for driving the selection electrodes (see for example Fig. 1 item 3 "SCANNING DRIVER SECTION") which, in the operation condition, within a sequence of m ($m > 1$) time periods, during each time period sequentially *drives the* (italicized words added to provide meaning as best understood by the Examiner) selection electrodes during a selection time with selection signals for driving picture elements, the drive means comprising means for driving a group of picture elements during time periods within a sequence of time periods (see for example column 5 lines 50-55, which describes the use of "frame rate control", which is well known in the art, as evidenced by the instant application publication [0004] - [0006], to include consecutive frame periods or super-frames, i.e. "a sequence of m ($m > 1$) time periods" made up of a certain number of consecutive, i.e. " m ($m > 1$)", frame periods, i.e. "time periods").

Matsueda does not expressly disclose the driving of different picture elements within a sequence of time periods being phase-shifted with respect to each other.

Ishii discloses a flat-panel display controller with improved dithering and frame rate control and in particular: the driving of different picture elements within a sequence of time periods being phase-shifted with respect to each other (see for example column 1 lines 39-42, "Frame Rate Control (FRC), which involves introduction of a phase shift for excitation of adjacent pixels ..."; or column 14 line 40 – column 15 line 5, which describes an example in which frame 11 is set to be the starting frame in the sequence or to use the language of the instant application: time period 1 is set to phase number 11).

Matsueda and *Ishii* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to modify the device of *Matsueda* to include a phase shift between pixels as taught by *Ishii*. The suggestion/motivation would have been to provide advantages such as to reduce visual flickering (see for example *Ishii* column 1 lines 38-42).

As to claim 7, which depends from claim 1, the teach of *Matsueda* that a sequence of time periods is a sequence of frame periods was covered in the rejection of claim 1.

19. **Claims 3-6, 8, and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,873,312 to *Matsueda* ("*Matsueda*") in view of U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*") and further in view of U.S. Patent No. 6,198,469 to *Tjandrasuwita* ("*Tjandrasuwita*").

As to **claim 3**, in addition to the rejection of claim 1 over *Matsueda* and *Ishii*, *Ishii* further discloses generating a phase shift adjustment after a sequence of time periods (see for example column 11 lines 40-50 and Fig. 9 where "VS" is the vertical sync signal indicative of the start of a new sequence of time periods; "VS" is defined at column 7 lines 7-10).

Matsueda and *Ishii* does not expressly disclose that the phase numbers of the time periods are increased or decreased by one after each sequence of time periods.

Tjandrasuwita discloses a frame-rate modulation method and in particular: increasing the phase numbers of the time periods by one after each sequence of time periods (see for example Fig. 6, 7 and column 12 line 13 to column 13 line 20) and column 14 line 37 – column 17 line 7; note that in Fig. 7, when FCDOUBLE is 0, one is added to the output once per frame; the output then is summed together with other values to arrive at the WAVEFORM INDEXs of Fig. 6, which indexes determine the phasing of the waveforms).

Matsueda, *Ishii* and *Tjandrasuwita* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to include an increment of 1 in the phase number after each sequence of time periods as taught by *Tjandrasuwita* in the device after *Matsueda* and *Ishii*. The suggestion/motivation would have been to provide advantages such as a cost effective modulation apparatus (see for example *Tjandrasuwita* column 2 lines 26-28).

As to **claim 4**, in addition to the rejection of claim 1 over *Matsueda* and *Ishii*:

Matsueda and *Ishii* does not necessarily expressly disclose a grayscale table for generating graylevel data in which grayscale table sequences of s sequential graylevels are defined by grouping s sequential graylevels within a sequence, said sequences being allotted to non-sequential selections of time periods within a sequence of time periods.

Tjandrasuwita discloses a frame-rate modulation method and in particular: a grayscale table (see for example TABLE 2) for generating graylevel data (see for example column 11 line 52 to column 12 line 11, in which “brightness-level waveforms” corresponds to “graylevel data”) in which grayscale table sequences of s sequential graylevels are defined by grouping s sequential graylevels within a sequence (see for example Table 2, which shows a table as claimed with $s=1$, that is each “1”, for example, makes up a sequence), said sequences being allotted to non-sequential selections of time periods (see for example Table 2,

which shows the “1”s time periods separated from other “1”s time periods by “0”s time periods as much as possible given the relative numbers of “1”s and “0”s making the time periods to which they are allotted non-sequential) within a sequence of time periods (see for example Table 2, with “time periods” corresponding to the frames and “sequence of time periods” corresponding to the sequence of 16 frames).

Matsueda, Ishii and *Tjandrasuwita* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to use a grayscale table as taught by *Tjandrasuwita* in the device after *Matsueda* and *Ishii*. The suggestion/motivation would have been to provide advantages such as a cost effective modulation apparatus (see for example column 2 lines 26-28) or the ability to program graylevel data sequences according to the requirements of the panel (see for example column 12 lines 1-11).

As to **claim 5**, in addition to the rejection of claim 4 over *Matsueda, Ishii* and *Tjandrasuwita*, *Tjandrasuwita* further discloses a sequence of selections being allotted to increasing gray values or decreasing gray values (see for example Table 2, which shows selections corresponding to rows and the sequence being from top to bottom in which case the gray values of the selections increase).

As to **claim 6**, in addition to the rejection of claim 5 over *Matsueda, Ishii* and *Tjandrasuwita*, *Tjandrasuwita* further discloses increases (or decreases) of the number of selections within a sequence of selections being allotted to one time period only (see for example column 11 lines 54-59, that the number of selections in the sequence is fixed at design time).

As to **claim 8**, in addition to the rejection of claim 5 over *Matsueda, Ishii* and *Tjandrasuwita*, *Tjandrasuwita* further discloses means to change the frame-phase of a frame during selection of said frame in subsequent sequences of frame periods (see for example Fig. 6, 7 and column 12 line 13 to column 13 line 20) and column 14 line 37 – column 17 line 7; note that in Fig. 6, when FCDOUBLE is 0, one is added to the output once per frame; the output then is summed together with other values to arrive at the WAVEFORM INDEXs of Fig. 6, which indexes determine the phasing of the waveforms; this incrementing of the phase number, which is applied to all the pixels of the frame, at the start of the frame corresponds to a change in the frame-phase of the frame.).

Claim 11 is a broader version of claim 3 and is rejected on the same grounds and arguments.

20. **Claims 9 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,873,312 to *Matsueda* ("*Matsueda*") in view of U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*") and further in view of U.S. Patent No. 6,897,884 to *Tsuge et al.* ("*Tsuge*")

As to claim 9, in addition to the rejection of claim 1 over *Matsueda* and *Ishii*:

Matsueda and *Ishii* does not expressly disclose means to apply during sub-selection times of a selection time different voltages to the column electrodes.

Tsuge discloses a matrix display and its drive method that combines FRC with pulse width modulation or pulse height modulation (see for example abstract) and in particular: means to apply during sub-selection times of a selection time different voltages to the column electrodes (see for example column 1 lines 38-43, which describes PWM, which corresponds to "different voltages" applied during "sub-selection times", applied to "a segment signal line", which corresponds to a column electrode, during a "horizontal scanning period", which corresponds to a selection time).

Matsueda, *Ishii* and *Tsuge* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to apply PWM to the column electrodes as taught by

Tsuge in the device after *Matsueda* and *Ishii*. The suggestion/motivation would have been to provide advantages such as to reduce the number of frames required for FRC and thereby reduce power consumption and suppress flicker (see for example *Tsuge* abstract).

Claim 12 is a restatement of claim 9 with the added limitation that $p=1$, which examiner assumes to mean that one row at a time is selected, and is rejected on the same grounds and arguments plus the argument that selecting a single row at a time was well known to those skilled in the art at the time of the invention, thus it would have been fairly suggested to one of ordinary skill in the art by the combination cited for claim 9.

21. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,873,312 to *Matsueda* ("*Matsueda*") in view of U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*") and further in view of U.S. Patent No. 6,198,469 to *Tjandrasuwita* ("*Tjandrasuwita*") and further in view of U.S. Patent No. 6,897,884 to *Tsuge et al.* ("*Tsuge*").

As to **claim 10**, in addition to the rejection of claim 1 over *Matsueda* and *Ishii*, *Ishii* further discloses modifying the phase of pixel display according to row (see for example Fig. 9(a) item 920 "Row Counter", which provides an input to item 924 "Phase Generator"; selection of a row corresponds to a "selection time")

Matsueda and *Ishii* does not expressly disclose means to change the sub-selection time-phase during selection of a sub-selection time in subsequent sequences of selection times.

Tjandrasuwita discloses a frame-rate modulation method and in particular: means to change the pixel-display time-phase during selection of a pixel-display time in subsequent sequences of selection times (see for example Fig. 6, 9 and column 13 line 64 to column 14 line 20 and column 14 line 37 to column 17 line 7; note especially column 14 lines 60-67 "...the frame offset value, the horizontal pixel offset value, the vertical line offset value, and the color offset values are used as variables in determining the waveform accessing index..." which is the WAVEFORM INDEXs of Fig. 6, which indexes determine the phasing of the waveforms).

Matsueda, *Ishii* and *Tjandrasuwita* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to include a change of time-phase during selection of a pixel-display time in subsequent sequences of selection times as taught by *Tjandrasuwita* in the device after *Matsueda* and *Ishii*. The suggestion/motivation would have been to provide advantages such as to prevent screen flickering (see for example *Tjandrasuwita* column 15 lines 1-7).

Matsueda, *Ishii* and *Tjandrasuwita* does not expressly disclose changing the display state of pixels during sub-selection times of a selection time.

Tsuge discloses a matrix display and its drive method that combines FRC with pulse width modulation or pulse height modulation (see for example abstract) and in particular: means to change the display state of pixels during sub-selection times of a selection time by applying during sub-selection times of a selection time different voltages to the column electrodes (see for example column 1 lines 38-43, which describes PWM, which corresponds to "different voltages" applied during "sub-selection times", applied to "a segment signal line", which corresponds to a column electrode, during a "horizontal scanning period", which corresponds to a selection time); and further discloses applying phase shifts to the on-off times of pixels according to both line and frame (see for example Fig. 2 and 3 and column 10 lines 8-35 with line selections corresponding to a selection time).

Matsueda, Ishii, Tjandrasuwita and *Tsuge* are analogous art because they are from the same field of endeavor, which is liquid crystal displays.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to apply PWM to the column electrodes as taught by *Tsuge* in the device after *Matsueda, Ishii, Tjandrasuwita*. The suggestion/motivation would have been to provide advantages such as to reduce the number of frames required for FRC and thereby reduce power consumption and suppress flicker (see for example *Tsuge* abstract).

Matsueda, Ishii, Tjandrasuwita and *Tsuge* disclose the claimed invention except for the extension of the concept of changing the time-phase of pixels

during sub-selection times. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply time-phase changes to sub-selection times. The prior art as described above contained the teaching that the on-off times of neighboring pixels should not be synchronized. The extension of this concept from frames to sub-selection times would have been obvious to one of ordinary skill in the art at the time of the invention. One of ordinary skill in the art could have applied time-phase changes according to sub-selection times and the results would have been predictable in that the chance for flicker would have been further reduced.

22. **Claims 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,873,312 to *Matsueda* ("*Matsueda*") in view of U.S. Patent No. 6,362,834 to *Ishii* ("*Ishii*") and further in view of Applicant's admitted prior art.

Claim 13 adds only the limitation that $p=4$, which Examiner assumes to mean that 4 rows are simultaneously selected, to claim 1. Claim 13 is rejected on the same grounds and arguments as claim 1 with the addition arguments that:

Applicant's admitted prior art describes a drive scheme in which multiple rows are selected at a time.

It would have been obvious to one of ordinary skill in the art at the time of the invention to select multiple rows at a time. The suggestion/motivation would

have been to provide advantages such as to use an art recognized drive method or to reduce flicker.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,751,264 to Cavallerano et al. teaches distributing on and off times to reduce the number of transitions in a grayscale sequence see for example column 8 lines 30-38.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT R. RAINEY whose telephone number is (571)270-3313. The examiner can normally be reached on Monday through Friday 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on (571) 272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/RR/

/Amare Mengistu/
Supervisory Patent Examiner, Art Unit 2629